

AMENDMENTS TO THE CLAIMS

The listing of claims presented below will replace all prior versions and listings of claims in the application.

Listing of claims:

1. (**currently amended**) An inter-frame wavelet coding apparatus, comprising:

a Motion Compensated Temporal Filtering (MCTF) unit for computing **[[a]]** motion vectors of a group of pictures (GOP), and **performing a lowpass filtering and a highpass filtering** the GOP with respect to ~~the~~ **a first** temporal axis **using the motion vectors, to thereby in order to** obtain **a lowpass and a highpass** filtered **frame frames;**

wherein the MCTF unit performs the lowpass filtering and the highpass filtering on the lowpass filtered frame of the first temporal axis for at least one or more second temporal axis;

a wavelet transforming unit for performing spatial wavelet transform on **each of** the **highpass** filtered **frame frames and a final lowpass filtered frame** and outputting **[[a]]** wavelet coefficients **of each temporal level for each of the highpass filtered frames and the final lowpass filtered frame;**

a quantization unit for quantizing the wavelet coefficients;

an entropy coding unit for entropy-coding the motion vectors ~~computed in the MCTF unit~~ and the quantized wavelet coefficients, **to thereby in order to** generate an entropy-coded bit stream; and

a wavelet filter managing unit for selecting a decomposition level and a filter length for the wavelet transforming unit based on motion estimation information of the GOP, **which are obtained by performing the lowpass filtering and the highpass**

filtering the GOP in the MCTF unit; video computed in the MCTF unit,

wherein the wavelet filter managing unit respectively selects the decomposition level and the filter length for each of the highpass filtered frames and the final lowpass filtered frame;

wherein the decomposition level and the filter length for each of the highpass filtered frames are selected properly to the amount of information of each frame based on the motion estimation information;

wherein the decomposition level and the filter length for the final lowpass filtered frame are selected a maximum decomposition level and a maximum filter length;

wherein the decomposition level and the filter length are included in the entropy-coded bit stream.

2. (**currently amended**) The inter-frame wavelet coding apparatus as recited in claim 1, wherein ~~the MCTF unit performs lowpass filtering and highpass filtering on a lowpass filtered frame repeatedly, and~~ the wavelet filter managing unit selects ~~a decomposition level and a filter length for the wavelet transforming unit based on the information amount of the filtered frame~~ the decomposition level and the filter length based on a computing capability of a decoding apparatus to minimize a decoding computation of the decoding apparatus by having an optimum computation amount.

3. (**currently amended**) The inter-frame wavelet coding apparatus as recited in

claim **[[2]] 1**, wherein the wavelet transforming unit includes:

a first wavelet transformer having **a the** maximum decomposition level and **a the** maximum filter length, **[[for]] and** wavelet-transforming **a the** final lowpass-filtered frame; and

a second wavelet transformer having a decomposition level and a filter length equal to or smaller than the decomposition level and the filter length of the first wavelet transformer, **and** wavelet-transforming **the rest highpass-filtered GOP frames each of the highpass filtered frames.**

4. (original) The inter-frame wavelet coding apparatus as recited in claim 3, wherein the wavelet filter managing unit selects a 9/7 filter having a three or four-stage decomposition level as the first wavelet transformer.

5. (original) The inter-frame wavelet coding apparatus as recited in claim 3, wherein the wavelet filter managing unit selects a 5/3 filter having a three or four-stage decomposition level as the first wavelet transformer.

6. (original) The inter-frame wavelet coding apparatus as recited in claim 3, wherein the wavelet filter managing unit selects a Haar filter having one-stage decomposition level as the second wavelet transformer.

7. (**currently amended**) An inter-frame wavelet encoding apparatus, comprising:
a Motion Compensated Temporal Filtering (MCTF) an-MCTF unit for

computing motion vectors of **performing** a group of pictures (GOP)₁ and **repeatedly performing a** lowpass filtering and **a** highpass filtering the GOP with respect to **the a first** temporal axis **using the motion vectors, in order to obtain a lowpass and a highpass filtered frames; and performing lowpass filtering and highpass filtering on a lowpass-filtered frame repeatedly**

wherein the MCTF unit performs lowpass filtering and highpass filtering on the lowpass filtered frame of the first temporal axis for at least one or more second temporal axis;

a first wavelet transformer having a maximum decomposition level and a maximum filter length, **[[for]] and** wavelet-transforming a final lowpass-filtered frame;

a second wavelet transformer for each of the highpass filtered GOP frames

a second wavelet transformer having a decomposition level and a filter length equal to or smaller than the decomposition level and the filter length of the first wavelet transformer, **[[for]] and** wavelet-transforming **the rest highpass-filtered GOP frames each of the highpass filtered frames;**

a quantization unit for quantizing wavelet coefficients **of each temporal level for each of the highpass filtered frames and the final lowpass filtered frame; and**

wherein the wavelet coefficients are outputted from the first and second wavelet transformer **by the wavelet-transforming; [[and]]**

an entropy coding unit for entropy-coding the motion vectors **s computed in the MCTF-unit** and the **quantized** wavelet coefficients; **quantized in the quantization-unit.**

wherein the decomposition level and the filter length of the first and second wavelet transformer are controlled based on motion estimation

information of the GOP, which are obtained by performing the lowpass filtering and the highpass filtering the GOP in the MCTF unit;

wherein the decomposition level and the filter length of the second wavelet transformer for each of the highpass filtered frames are controlled properly to the amount of information of each frame based on the motion estimation information;

wherein the decomposition level and the filter length of the first wavelet transformer for the final lowpass filtered frame are controlled the maximum decomposition level and the maximum filter length.

8. (original) The inter-frame wavelet coding apparatus as recited in claim 7, wherein the first wavelet transformer includes a $9/7$ filter having a three or four-stage decomposition level.

9. (original) The inter-frame wavelet coding apparatus as recited in claim 8, wherein the first wavelet transformer includes a $5/3$ filter having a three or four-stage decomposition level.

10. (original) The inter-frame wavelet coding apparatus as recited in claim 8, wherein the second wavelet transformer includes a Haar filter having a one-stage decomposition level.

11. (**currently amended**) An inter-frame wavelet video decoding apparatus, comprising:

an entropy decoding unit for entropy-decoding bit stream including information on a decomposition level and a filter length for inverse wavelet transform;

an inverse quantization unit for inverse quantizing **[[a]]** quantized wavelet coefficients which is outputted from the entropy decoding unit;

an inverse wavelet transforming unit for performing wavelet transform on the wavelet coefficients outputted from the inverse quantization unit based on the decomposition level and the filter length; and

a Motion Compensated Temporal Filtering (MCTF) combining unit for performing MCTF combination on **[[a]]** motion vectors of the entropy decoding unit, **and outputting a group of pictures (GOP);**

wherein the GOP is performed a lowpass filtering and a highpass filtering with respect to a first temporal axis using the motion vectors based on the MCTF, in order to obtain a lowpass and a highpass filtered frames;

wherein the GOP is performed the lowpass filtering and the highpass filtering on the lowpass filtered frame of the first temporal axis for at least one or more second temporal axis

wherein the decomposition level and the filter length for each of highpass filtered frames and a final lowpass filtered frame are respectively controlled based on motion estimation information of the GOP;

wherein the decomposition level and the filter length for each of the highpass filtered frames are controlled properly to the amount of information of each frame based on the motion estimation information;

wherein the decomposition level and the filter length for the final lowpass

filtered frame are controlled a maximum decomposition level and a maximum filter length.

12. (**currently amended**) An inter-frame wavelet coding method, comprising the steps of:

a) computing motion vectors of a group of pictures (GOP), and performing Motion Compensated Temporal Filtering (MCTF) the GOP;

wherein the MCTF performs a lowpass filtering an inputted group of pictures (GOP)-video and a highpass filtering the GOP with respect to [[the]] a first temporal axis using the motion vectors, to thereby in order to obtain a lowpass and a highpass filtered frames;

wherein the MCTF performs the lowpass filtering and the highpass filtering on the lowpass filtered frame of the first temporal axis for at least one or more second temporal axis;

b) performing spatial wavelet transform on each of the highpass filtered frames and a final lowpass filtered frame, and outputting wavelet coefficients of each temporal level for each of the highpass filtered frames and the final lowpass filtered frame;

c) quantizing [[a]] the wavelet coefficients; ~~generated during the wavelet transform of the step b);~~

d) performing entropy-encoding on [[a]] the motion vectors ~~computed in the MCTF process of the step a)~~ and the quantized wavelet coefficients, quantized in the quantization process of the step c), to thereby in order to generate an entropy-

coded bit stream;

e) selecting a decomposition level and a filter length for the spatial wavelet transform based on motion estimation information of the GOP obtained by computed in the MCTF ~~process of the step a)~~; and

f) including information on the decomposition level and the filter length in the entropy-coded bit stream;

wherein the step e) respectively selects the decomposition level and the filter length for each of the highpass filtered frames and the final lowpass filtered frame;

wherein the decomposition level and the filter length for each of the highpass filtered frames are selected properly to the amount of information of each frame based on the motion estimation information;

wherein the decomposition level and the filter length for the final lowpass filtered frame are selected a maximum decomposition level and a maximum filter length.

13. (~~currently amended~~) The inter-frame wavelet coding method as recited in claim 12, wherein ~~the step a) includes the step of a1) performing lowpass filtering and highpass filtering on a lowpass-filtered frame repeatedly, and~~

~~in the step e) the decomposition level and the filter length are selected based on the information amount of the filtered frame selects the decomposition level and the filter length based on a computing capability of a decoding apparatus to minimize a decoding computation of the decoding apparatus by~~

having an optimum computation amount.

14. (**currently amended**) The inter-frame wavelet coding method as recited in claim **[[13]] 12**, wherein the step b) includes the steps of:

b1) performing wavelet transform on **[[a]] the** final lowpass-filtered frame by using a first wavelet transformer **having a which has the** maximum decomposition level and **a the** maximum filter length; and

b2) performing wavelet transform on **each of the highpass filtered frames the rest GOP frames** by using a second wavelet transformer, **which has** having a decomposition level and a filter length equal to or smaller than the decomposition level and the filter length of the first wavelet transformer.

15. (original) The inter-frame wavelet coding method as recited in claim 14, wherein in the step e) a 9/7 filter having a three or four-stage decomposition level is selected as the first wavelet transformer.

16. The inter-frame wavelet coding method as recited in claim 14, wherein in the step e) a 5/3 filter having a three or four-stage decomposition level is selected as the first wavelet transformer.

17. (original) The inter-frame wavelet coding method as recited in claim 14, wherein in the step e) a Haar filter having a one-stage decomposition level is selected as the second wavelet transformer.

18. (**currently amended**) An inter-frame wavelet decoding method, comprising the steps of:

a) performing entropy-decoding on bit stream including information on a decomposition level and a filter length for inverse wavelet transform;

b) inverse-quantizing **[[a]]** quantized wavelet coefficients generated in the step a);

c) performing inverse wavelet transform on **[[a]]** wavelet coefficients generated in the step b) based on the information on the decomposition level and the filter length; and

d) performing a Motion Compensated Temporal Filtering (MCTF) combination based on **[[a]]** motion vectors obtained in the step a), **and outputting a group of pictures (GOP);**

wherein the GOP is performed a lowpass filtering and a highpass filtering with respect to a first temporal axis using the motion vectors based on the MCTF, in order to obtain a lowpass and a highpass filtered frames;

wherein the GOP is performed the lowpass filtering and the highpass filtering on the lowpass filtered frame of the first temporal axis for at least one or more second temporal axis

wherein the decomposition level and the filter length for each of highpass filtered frames and a final lowpass filtered frame are respectively controlled based on motion estimation information of the GOP;

wherein the decomposition level and the filter length for each of the

highpass filtered frames are controlled properly to the amount of information of each frame based on the motion estimation information;

wherein the decomposition level and the filter length for the final lowpass filtered frame are controlled a maximum decomposition level and a maximum filter length.